CE364: CRYPTOGRAPHY & NETWORK SECURITY

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	3	2	-	5	**4**
Marks	100	50	-	150	

Pre-requisite courses:

- N/A

Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Introduction	02
2.	Traditional Symmetric-Key Ciphers	04
3.	Introduction to Modern Symmetric-Key Ciphers	03
4.	Data Encryption Standard (DES)	03
5.	Advanced Encryption Standard (AES)	03
6.	Asymmetric-Key Cryptography	05
7.	Message Integrity and Message Authentication	04
8.	Cryptographic Hash Functions	04
9.	Digital Signature	04
10.	Entity Authentication	04
11.	Key Management	03
12.	Security at the Application Layer: PGP and S/MIME	02
13.	Security at the Transport Layer: SSL and TLS	02
14.	Security at the Network Layer: IPSec	02
	Total hours (Theory) :	45
	Total hours (Lab) :	30
	Total hours :	75

Detailed Syllabus:

1.	**Introduction**	**02 Hours**	**06%**
	Security Goals, Attacks, Services and Mechanism and Techniques.		
2.	**Traditional Symmetric-Key Ciphers**	**04 Hours**	**10%**
	Introduction, Substitution Cipher, Transposition Cipher, Stream and Block Cipher		
3.	**Introduction to Modern Symmetric-Key Ciphers**	**03 Hours**	**06%**
	Modern Block Cipher, Modern Stream Cipher		
4.	**Data Encryption Standard (DES)**	**03 Hours**	**10%**
	Introduction, DES structure and Analysis, Multiple DES		
5.	**Advanced Encryption Standard (AES)**	**03 Hours**	**06%**
	Introduction, AES structure and Analysis		
6.	**Asymmetric-Key Cryptography**	**05 Hours**	**10%**
	Introduction, RSA Cryptosystem, RABIN Cryptosystem, ELGAMAL Cryptosystem		
7.	**Message Integrity and Message Authentication**	**04 Hours**	**08%**
	Message Integrity, Message Authentication		
8.	**Cryptographic Hash Functions**	**04 Hours**	**08%**
	Introduction, SHA-512,MD5		
9.	**Digital Signature**	**04 Hours**	**06%**
	Services,RSA Digital Signature Scheme,ELGamal Digital Signature Scheme		
10.	**Entity Authentication**	**04 Hours**	**04%**
	Passwords, Challenge –Response,Zero –Knowledge		
11.	**Key Management**	**03 Hours**	**08%**
	Symmetric-Key Distribution,KERBEROS		
12.	**Security at the Application Layer: PGP and S/MIME**	**02 Hours**	**06%**
	E-Mail, PGP,S/MIME		
13.	**Security at the Transport Layer: SSL and TLS**	**02 Hours**	**06%**
	SSL Architecture		
14.	**Security at the Network Layer: IPSec**	**02 Hours**	**06%**
	Introduction to IPSec, IPSec Tunneling		

CE365: COMPILER CONSTRUCTION

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	3	2	-	5	**4**
Marks	100	50	-	150	

Pre-requisite courses:

- Digital Electronics
- Operating System
- Theory of Computation

Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Introduction to Compiler	07
2.	Lexical Analysis	04
3.	Syntax Analysis	16
4.	Syntax directed translation (SDT)	04
5.	Semantic Analysis & Intermediate Code Generation	04
6.	Runtime Environment	05
7.	Code Optimization and Code Generation	05
	Total hours (Theory) :	45
	Total hours (Lab) :	30
	Total hours :	75

Detailed Syllabus:

1.	**Introduction to Compiler**	**07 Hours**	**16%**
	Overview of Language processor, Compiler and its types, Overview and Use of Linker and Loader, Phases of compiler, The science of building compilers [Front End and Back End of Compiler], Applications of language processors		
2.	**Lexical Analysis**	**04 Hours**	**09%**
	The role of lexical analyzer, Tokens-Patterns-Lexemes, Input Buffering Technique, specification of tokens – Strings and Languages, Regular Expressions, recognition of tokens, lexical		

	analyzer generator (LEX)		
3.	**Syntax Analysis**	**16 Hours**	**35%**
	The role of a parser, Context Free Grammar, Top-down parsing – Recursive-Descent Parsing, Predictive Parser, Non-recursive Predictive Parser, Bottom-up parsing – Shift reduce parsing, LR(k) Parser, LALR Parser, Operator Precedence Parsing, More powerful LR parsers, Using ambiguous grammars, Automatic Parser Generators - YACC		
4.	**Syntax directed translation (SDT)**	**04 Hours**	**09%**
	Syntax directed definitions (SDD), Construction of Syntax Tree, Evaluation order of SDD's – Bottom Up Evaluation of S-Attributed Definitions, L-Attributed Definitions, Syntax Directed Definitions and Translation Schemes, Applications of SDT		
5.	**Semantic Analysis & Intermediate Code Generation**	**04 Hours**	**09%**
	Intermediate Languages, Different Intermediate Forms – Abstract Syntax Tree, Polish Notation, Three Address Code and its implementation , Assignment Statements, Boolean Expressions, Back patching, Procedure Calls		
6.	**Run Time Environment**	**05 Hours**	**11%**
	Symbol Table - Data structures to implement symbol table, Symbol Attributes, Symbol-Table entries, Local Symbol Table management, Global Symbol Table Structure, Storage bindings and Symbolic Registers, Data descriptors - Static and Dynamic storage allocation – Storage allocation and access in block structured programming languages – Array allocation and access- Compilation of expressions – Handling operator priorities – Intermediate code forms for expressions – code generator., Register Usage, The run-time stack, Parameter passing disciplines, Code sharing and Position-Independent code		
7.	**Code Optimization and Code Generation**	**05 Hours**	**11%**
	The Principal Sources of Optimization, Optimization of Basic		

	Blocks, Loops in Flow Graphs, Introduction to Global Data-Flow Analysis, Iterative Solution of Data-Flow Equations, Code-Improving Transformations, Dealing with Aliases, Data-Flow Analysis of Structured Flow Graphs, Efficient Data-Flow Algorithms, A Tool for Data-Flow Analysis, Estimation of Types, Symbolic Debugging of Optimized Code, Issues in the Design of a Code Generator, The Target Machine, Run-Time Storage Management, Basic Blocks and Flow Graphs, Register Allocation and Assignment, The DAG Representation of Basic Blocks, Peephole Optimization, Generating Code from DAGs, Dynamic Programming Code-Generation Algorithm, Code-Generator Generators		

Course Outcome (COs):

At the end of the course, the students will be able to

CO1	Understand design and processing of different language processor, loaders and linkers
CO2	Design top-down and bottom-up parsers
CO3	Identify different memory management schemes of language processors
CO4	Develop semantic analysis scheme to generate intermediate code
CO5	Apply different code optimization techniques
CO6	Develop algorithms to generate code for a target machine

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	3	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	2	2	2	-	2	-	-	-	-	-	-	-	-	-
CO5	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	2	-	-	1	-	-	-	-	-	-	-	-	-	-

CE366: CLOUD COMPUTING

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	3	2	-	5	4
Marks	100	50	-	150	

Pre-requisite courses:

- Operating System, Networking, Distributed System

Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Cluster Computing, Grid Computing Systems and Resource Management at Glance	08
2.	Fundamental of Virtualization	06
3.	Fundamental Concepts and Models	06
4.	Cloud-Enabling Technology	05
5.	Fundamental Cloud Architectures	07
6.	Advanced Cloud Architectures	08
7.	Implementation of Cloud	05
	Total hours (Theory) :	45
	Total hours (Lab) :	30
	Total hours :	75

Detailed Syllabus:

1.	**Cluster Computing, Grid Computing Systems and Resource Management at Glance**	**08 Hours**	**18%**
	Introduction, Eras of Computing, Scalable Parallel Computer Architectures, Towards Low Cost Parallel Computing and Motivations , A Cluster Computer and its Architecture, Clusters Classification, Commodity Components for Clusters, Grid Architecture and Service Modelling, Grid Projects and Grid Systems Built, Grid Resource Management and		

	Brokering, Software and Middleware for Grid Computing, Grid Application Trends		
2.	**Fundamental of Virtualization**	**06 Hours**	**12%**
	Type of Virtualization, Virtualization Technologies, Virtualizes your Environment, Managing Virtualization Environment, Storage Virtualization, Dockers		
3.	**Fundamental Concepts and Models**	**06 Hours**	**15%**
	Roles and Boundaries, Cloud Characteristics, Cloud Delivery Models, Cloud Deployment Models		
4.	**Cloud-Enabling Technology**	**05 Hours**	**14%**
	Broadband Networks and Internet Architecture, Data centre Technology, Virtualization Technology, Web Technology, Multitenant Technology, Service Technology		
5.	**Fundamental Cloud Architectures**	**07 Hours**	**16%**
	Workload Distribution Architecture, Resource Pooling Architecture ,Dynamic Scalability Architecture, Elastic Resource Capacity Architecture, Service Load Balancing Architecture, Cloud Bursting Architecture, Elastic Disk Provisioning Architecture, Redundant Storage Architecture		
6.	**Advanced Cloud Architectures**	**08 Hours**	**17%**
	Hypervisor Clustering Architecture ,Load Balanced Virtual Server Instances Architecture, Non-Disruptive Service Relocation Architecture, Zero Downtime Architecture ,Cloud Balancing Architecture ,Resource Reservation Architecture, Dynamic Failure Detection and Recovery Architecture		
7.	**Implementation of Cloud**	**05 Hours**	**08%**
	Study of Cloud Computing Systems like Amazon EC2 and S3, Google App Engine, and Microsoft Azure, Build Private/Hybrid Cloud using open source tools, Deployment of Web Services from Inside and Outside a Cloud Architecture. MapReduce and its extensions to Cloud Computing, HDFS, and GFS		